



## Utilizing vision and robotics technologies to protect aircrafts from Ground Support Equipment collisions **Assisted Docking | 2020**

### **Background**

Due to an emerging demand as well as stricter requirements from industry standards Ground Support Equipment (GSE) manufacturers all around the world are developing systems that protects the aircrafts from GSE collisions.

The systems are supposed to make sure the vehicles velocities are limited depending on the distance to the aircrafts. Besides limiting the velocities of vehicles, an Anti-Collision system is required to stop the GSE if a collision is about to occur. If said collision occurs it is important to register the collision and lock down the vehicle.

### **Assisted Docking**

Here at Power Stow we are developing a system called Assisted Docking to live up to the above-mentioned criteria and demands from the industry. The system is first and foremost designed as a "retrofit kit" to make sure Power Stow's +1700 existing units have the possibility of upgrading if a customer desires it. This means that the system should be able to work on numerous drivelines, chassis types and brands.

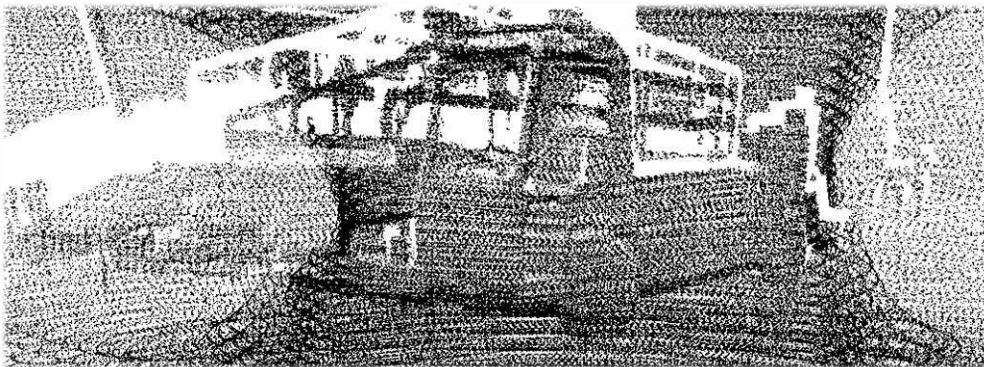
The solution is patent pending and consists of a parallel braking system, 3D sensors e.g. LiDAR's or stereo cameras, and an indication system.

#### **The parallel braking system**

In order to limit the velocity on numerous drivelines we are using a parallel braking system with a PID regulator. A velocity feedback is used to engage the brakes in a smooth manner if the velocity exceeds the maximum limit. The parallel braking system is also used to completely stop the vehicle if a collision is about to occur/if there has been a collision and the vehicle is in lock-down mode.

#### **3D sensors e.g. LiDAR's or stereo cameras**

Being able to identify an aircraft and the position of the GSE according to the cargo hold requires 3D data and algorithms to handle this data. We have a solution developed by an integrator that handles some of this 3D data in a sparse testing environment.



#### **Indication system**

Four lamps are placed in the field of view of the operator in order to guide the front of the vehicle into the cargo hold of the aircraft. Three colors, red, yellow, and green, are used to guide and warn the operator from left to right and also up and down. The four lamps can also indicate an obstacle, a collision and other relevant information to the operator.